



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Confirmation No.: 3473

Tsuyoshi YUKI et al.

Group Art Unit: 1714

Application No.: 10/632,108

Examiner: Shruti S. COSTALES

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For: VISCOSITY INDEX IMPROVER AND LUBE OIL CONTAINING THE SAME

DECLARATION

HONORABLE COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

SIR:

Now come TSUYOSHI YUKI who deposes and says that:

1. I am one of the inventors of the invention entitled "VISCOSITY INDEX IMPROVER AND LUBE OIL CONTAINING THE SAME" as claimed in United States Patent Application Serial Number 10/632,108 filed August 1, 2003.
2. I graduated from Kansai University in March, 1991. I then studied at the graduate school of the University and received a Masters Degree in connection with the study of Organic synthesis using organic metal catalyst in March, 1993. I have been working for Sanyo Chemical Industries, Ltd., in Kyoto, Japan, as a research chemist since April, 1993, particularly in the field of polymer chemistry.
3. I have measured low temperature viscosity, shear stability and viscosity index of lube oil compositions containing copolymers disclosed in U. S. Patent No. 6,746,993 B2, in the same manner as in the present invention.

Thereafter, these results were compared to examples of the present invention.

4. It is my opinion that the copolymers of the present invention are superior to the copolymers of the examples of U.S. Patent No. 6,746,993 B2 with respect to low temperature viscosity, shear stability and viscosity index of lube oil compositions.

The copolymers of the examples of U.S. Patent No. 6,746,993 B2 do not contain the units of monomer(c), such as hydroxyethyl methacrylate, acrylamide or methacrylic acid, and therefore the properties are inferior to the copolymer of the present invention.

In support of this opinion, the following experiments were performed.

Measurements of the properties of Lube Oil Composition containing Copolymer (A-1)-(A-7) disclosed in the examples of US 6,746,993 B2, was carried out in the same manners as in the present invention.

(1) Preparation of VII Concentrates and Lube Oil Compositions

Into 35 pbw of a mineral oil (solvent-refined oil having a KV of  $2.3 \text{ mm}^2/\text{s}$  at  $100^\circ\text{C}$ ), was dissolved 65 pbw of each of Polymers (A-1)-(A-7) and (B 4) to prepare Concentrates (CA-1) -(CA-7) and (CB 4), respectively.

Into a stainless steel vessel equipped with a stirrer, was charged 0.3 pbw of Concentrate (CB-4), followed by adding thereto a base oil (having a KV of  $4.6 \text{ mm}^2/\text{s}$  at  $100^\circ\text{C}$ , a VI of 118 and a pour point of  $-17.5^\circ\text{C}$ ) and each of Concentrates (CA-1) - (CA-7), in such an amount providing a lube oil composition of a KV in the range of  $14.3 \pm 0.2 \text{ mm}^2/\text{s}$  at  $100^\circ\text{C}$  to prepare 100 pbw of lube oil compositions. Resulting amount of each Concentrates were 29 pbw in each lube oil compositions.

(2) Measurement of the properties of Lube Oil Composition.

Properties were evaluated according to the procedure described in the specification of the present invention, as follows.

- (i) Viscosity, measured at -40 °C according to JPI-5S-26-85.
- (ii) VI, measured in accordance with JIS-R-2283.
- (iii) Shear stability, measured according to CEC L45-45-A-99 , for test period of 20 hours.

Results are shown in Table-1, with the original data of the present invention.



Table-1

Polymer	Present Invention											
	A1	A2	A3	A4	A5	A6	A7	A-1	A-2	A-3	A-4	A-5
(a) 2-decyl -tetradecyl or DTM	50	30				50	50	32				
2-octyl -dodecyl			30	50	20							
2-dodecyl -hexadecyl									20			20
2-decyl-tetradecyloxy ethyl										20		
n-dodecyl												
n-tetradecyl	31	51	52	22	10	41	31		32	38		30
n-hexadecyl or HM				6	22			30	12	10	32	12
n-octadecyl or OM				3	9							
hydroxyethyl acrylamide	19	19	18	18	19							
methacrylic acid							19					
methyl dimethyl aminopropyl								36	36	32	38	30
VI	216	215	206	209	212	197	212	182	185	185	185	184
Low temperature viscosity (*)	52	90	90	80	75	100	100	> 400	> 400	> 400	> 400	> 400
Shear stability (%)	3.5	3.6	3.9	4.0	3.8	4.5	4.0	14.0	14.0	15.0	14.0	15.0

\*) m p a . s . x 1 0 3

5. I declare further that all statements made herein of my own knowledge are true and that all statements based on information and belief are believed to be true; and, further, that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Further, deponents sayeth not.

Date: Aug. 31, 2006

Tsuyoshi Yuki  
Tsuyoshi YUKI